

Knowledge-Based System Environment

Example: CLIPS

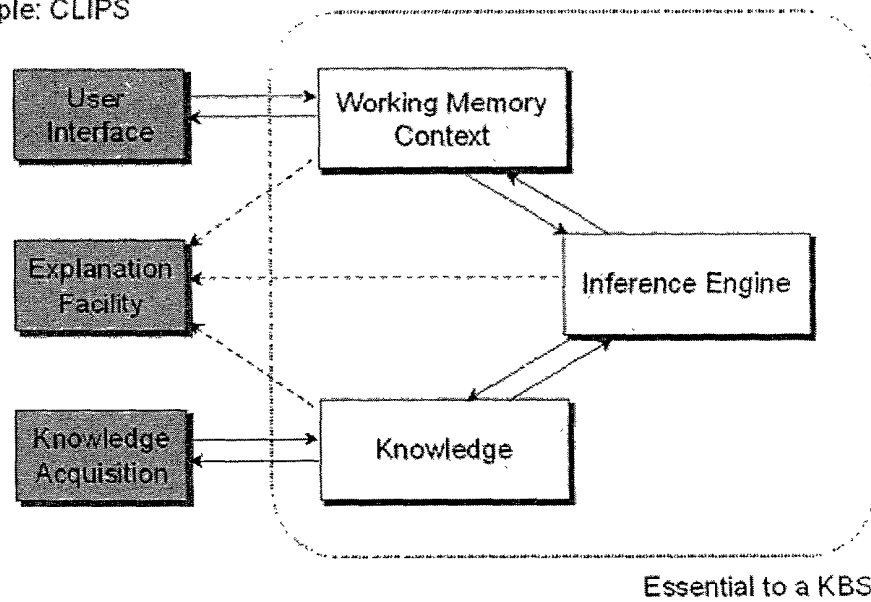


FIG. 1

BELIEF NETWORKS

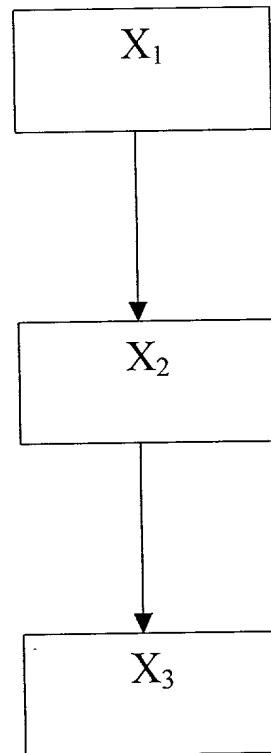


FIG. 2

3-D ELICIT MODEL

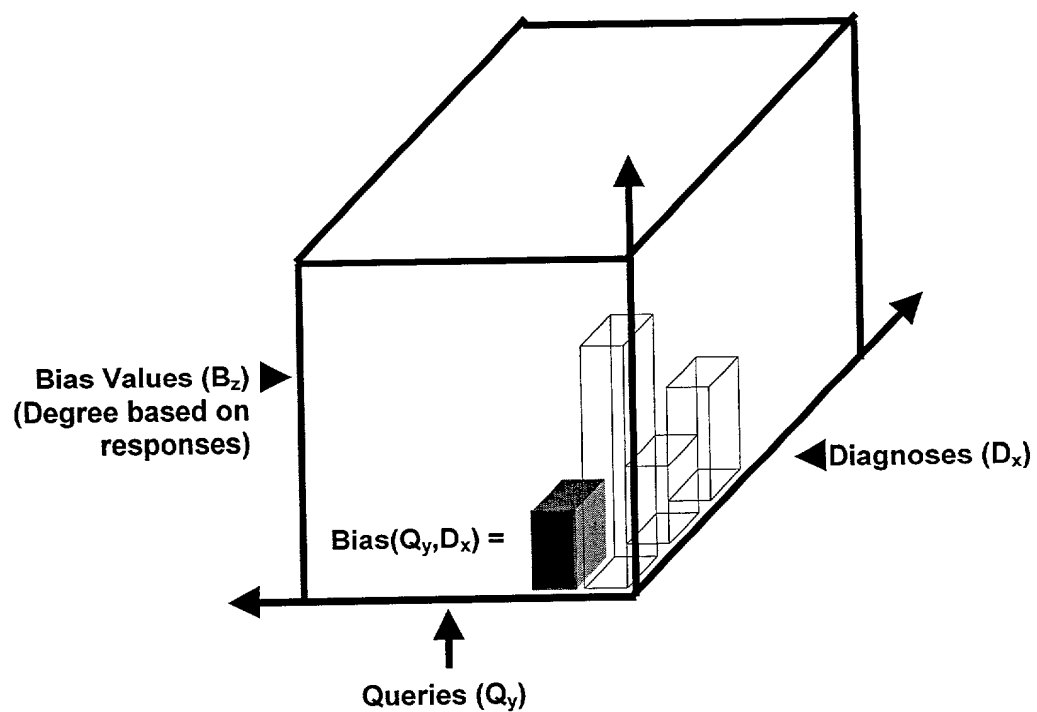
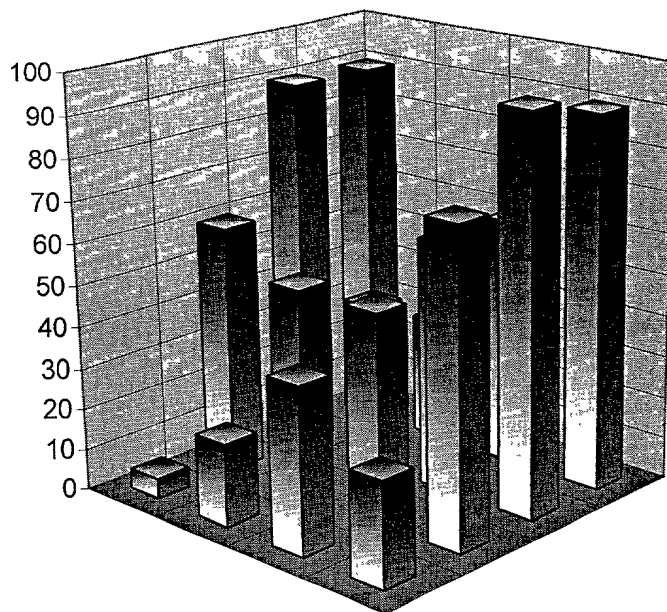


FIG. 3

Sample 3-D Model



Bias = $B(D_1, Q_1) = 90$

	D ₁	D ₂	D ₃	D ₄
Q ₁	90	80	45	55
Q ₂	100	20	85	15
Q ₃	25	45	90	95
Q ₄	45	65	20	80

FIG. 4

End Implementation

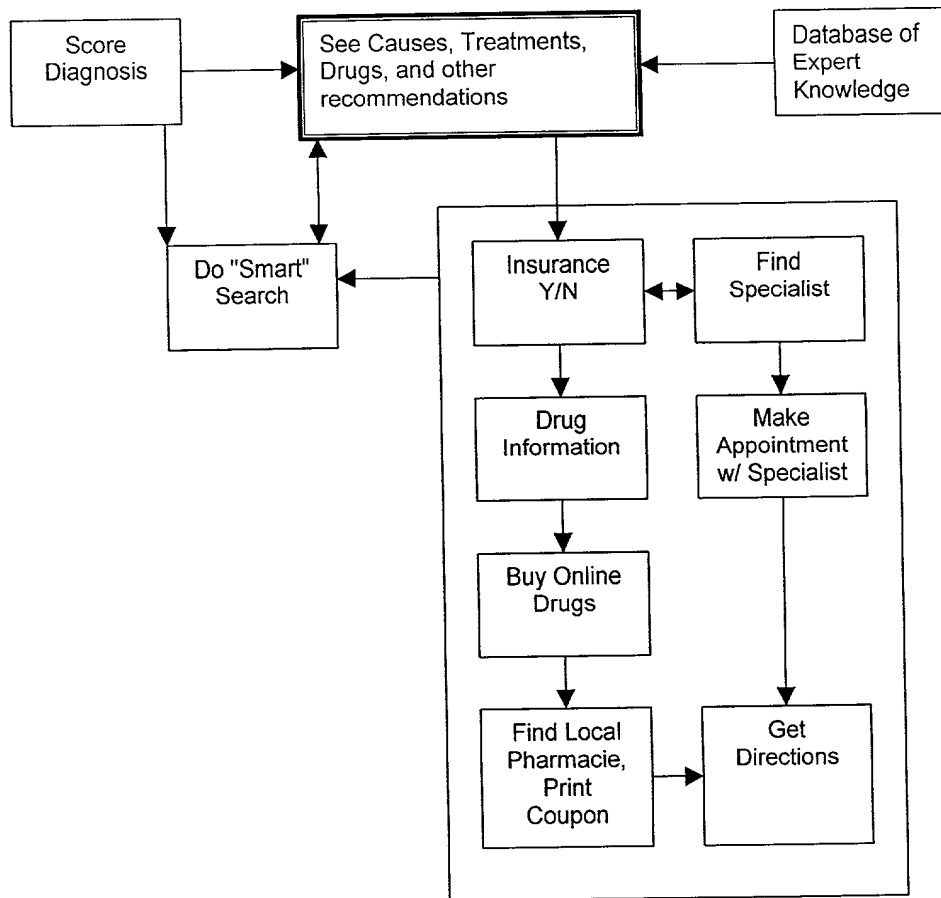


FIG. 5

Process - Acquisition of Expert Data

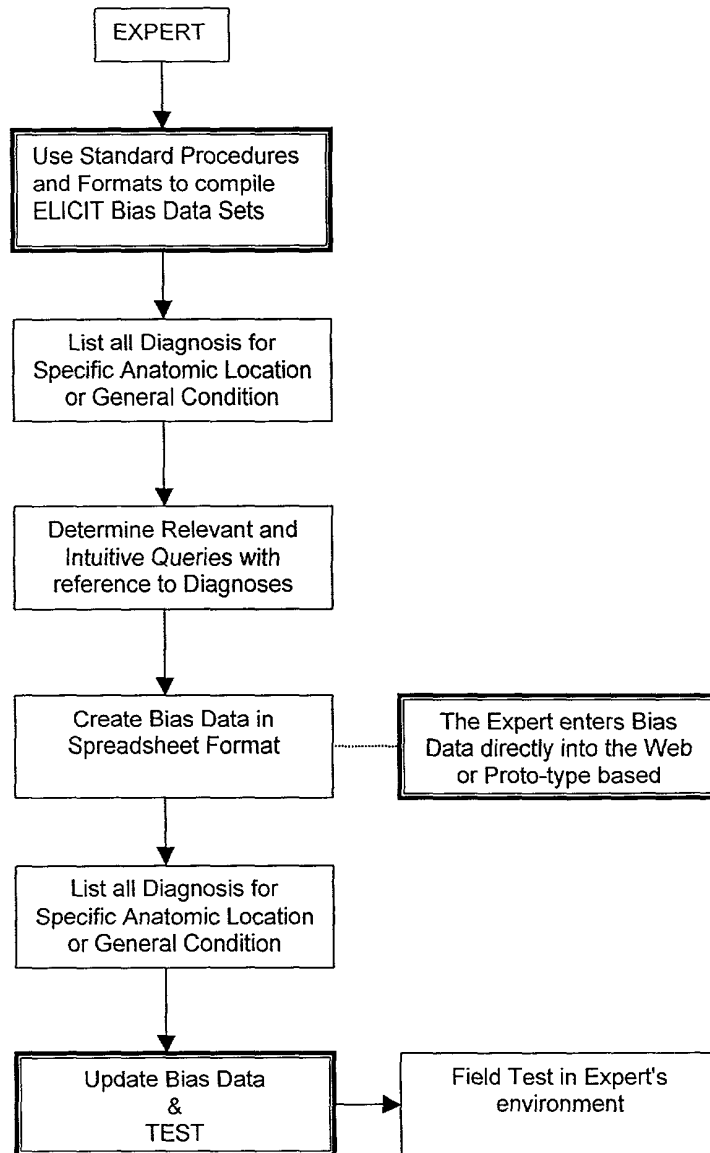


FIG. 6

SAMPLE EXPERT 3D-DATA INPUT SCREEN

MENU
Add Query
Add Diagnosis

▼ Queries ▼
Diagnoses ►

		ACL Tear	PCL Tear	MM Tear	L
Edit	Was there an injury?	90 <input type="checkbox"/>	90 <input type="checkbox"/>	90 <input type="checkbox"/>	
Edit	Did you trip or fall?	20 <input type="checkbox"/>	30 <input type="checkbox"/>	30 <input type="checkbox"/>	
Edit	Were you in an accident involving a vehicle?	30 <input type="checkbox"/>	30 <input type="checkbox"/>	20 <input type="checkbox"/>	
Edit	Were you playing a sport?	70 <input type="checkbox"/>	70 <input type="checkbox"/>	70 <input type="checkbox"/>	
Edit	Did you twist your knee?	70 <input type="checkbox"/>	70 <input type="checkbox"/>	70 <input type="checkbox"/>	
Edit	Did you injure your knee while jumping?	60 <input type="checkbox"/>	60 <input type="checkbox"/>	60 <input type="checkbox"/>	
Edit	Was the injury pain immediate?	80 <input type="checkbox"/>	70 <input type="checkbox"/>	60 <input type="checkbox"/>	
Edit	Was the injury pain delayed?	20 <input type="checkbox"/>	30 <input type="checkbox"/>	30 <input type="checkbox"/>	
Edit	Was the injury swelling immediate?	80 <input type="checkbox"/>	70 <input type="checkbox"/>	60 <input type="checkbox"/>	
Edit	Was the injury swelling delayed?	20 <input type="checkbox"/>	30 <input type="checkbox"/>	30 <input type="checkbox"/>	
Edit	Was there swelling above or around the kneecap?	95 <input type="checkbox"/>	85 <input type="checkbox"/>	80 <input type="checkbox"/>	
Edit	Walking in general or level ground	10 <input type="checkbox"/>	10 <input type="checkbox"/>	40 <input type="checkbox"/>	
Edit	Walking up or down hills	20 <input type="checkbox"/>	20 <input type="checkbox"/>	40 <input type="checkbox"/>	
Edit	Running	30 <input type="checkbox"/>	20 <input type="checkbox"/>	40 <input type="checkbox"/>	
Edit	Biking	20 <input type="checkbox"/>	10 <input type="checkbox"/>	30 <input type="checkbox"/>	
Edit	Squatting	30 <input type="checkbox"/>	20 <input type="checkbox"/>	80 <input type="checkbox"/>	
Edit	While sitting	20 <input type="checkbox"/>	10 <input type="checkbox"/>	40 <input type="checkbox"/>	

FIG. 7

Set Response Ranking

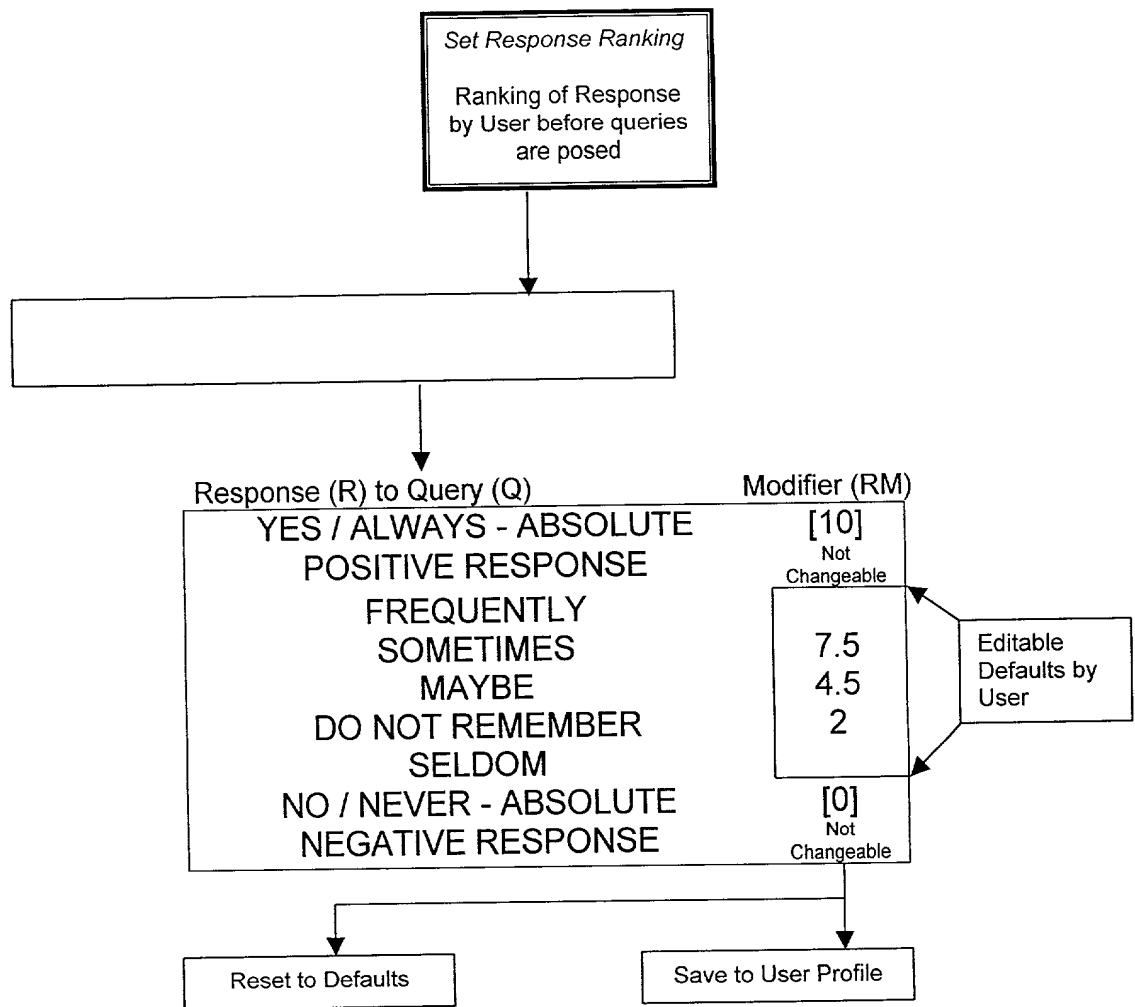


FIG. 8

COMPUTER

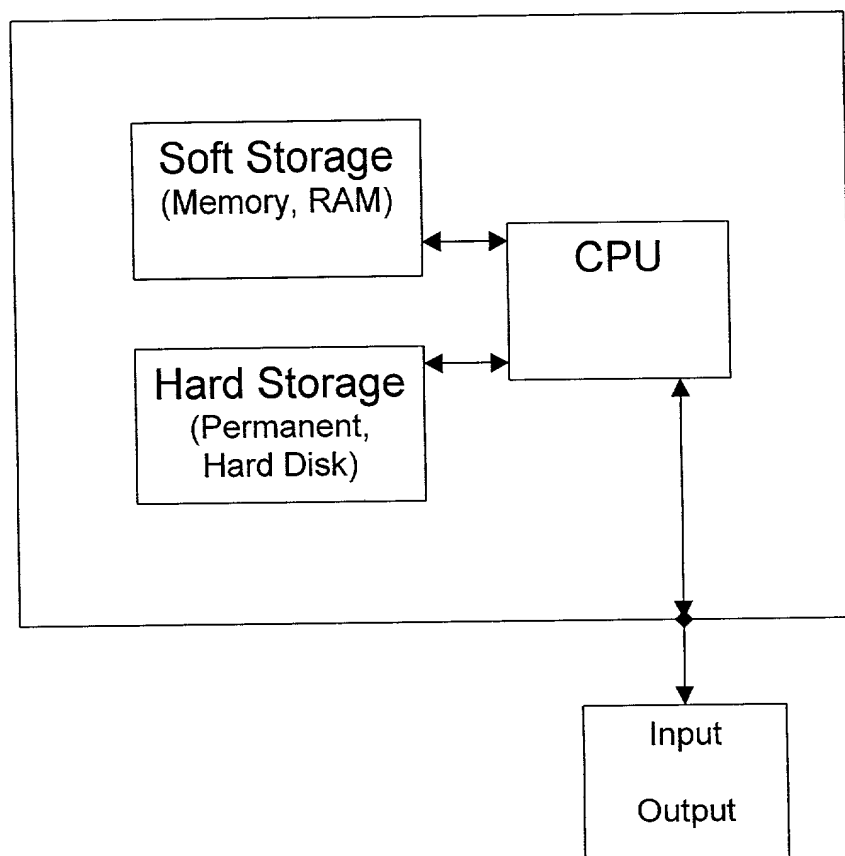


FIG. 9

General Description

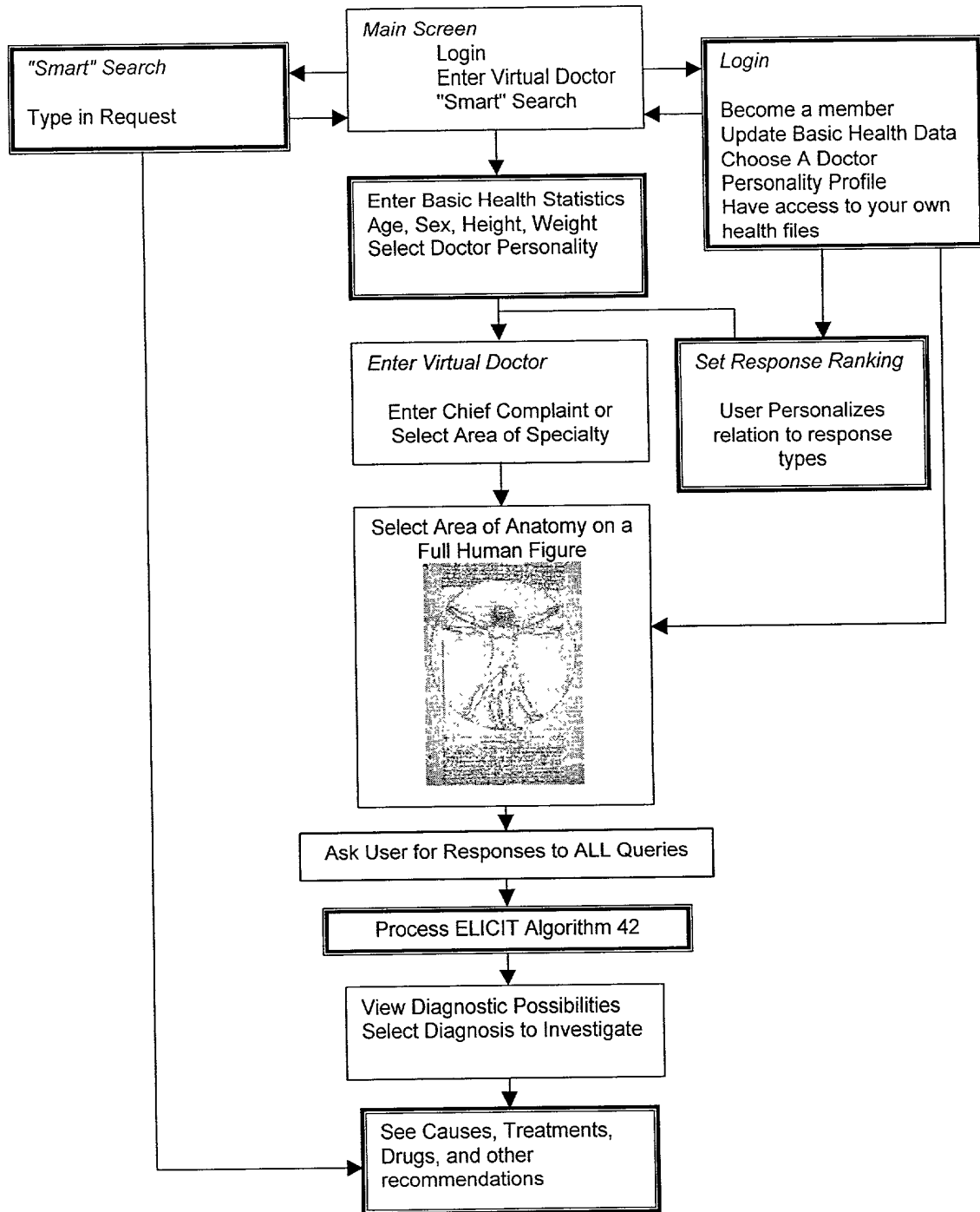


FIG. 10

Login / Enter Basic Health Stats

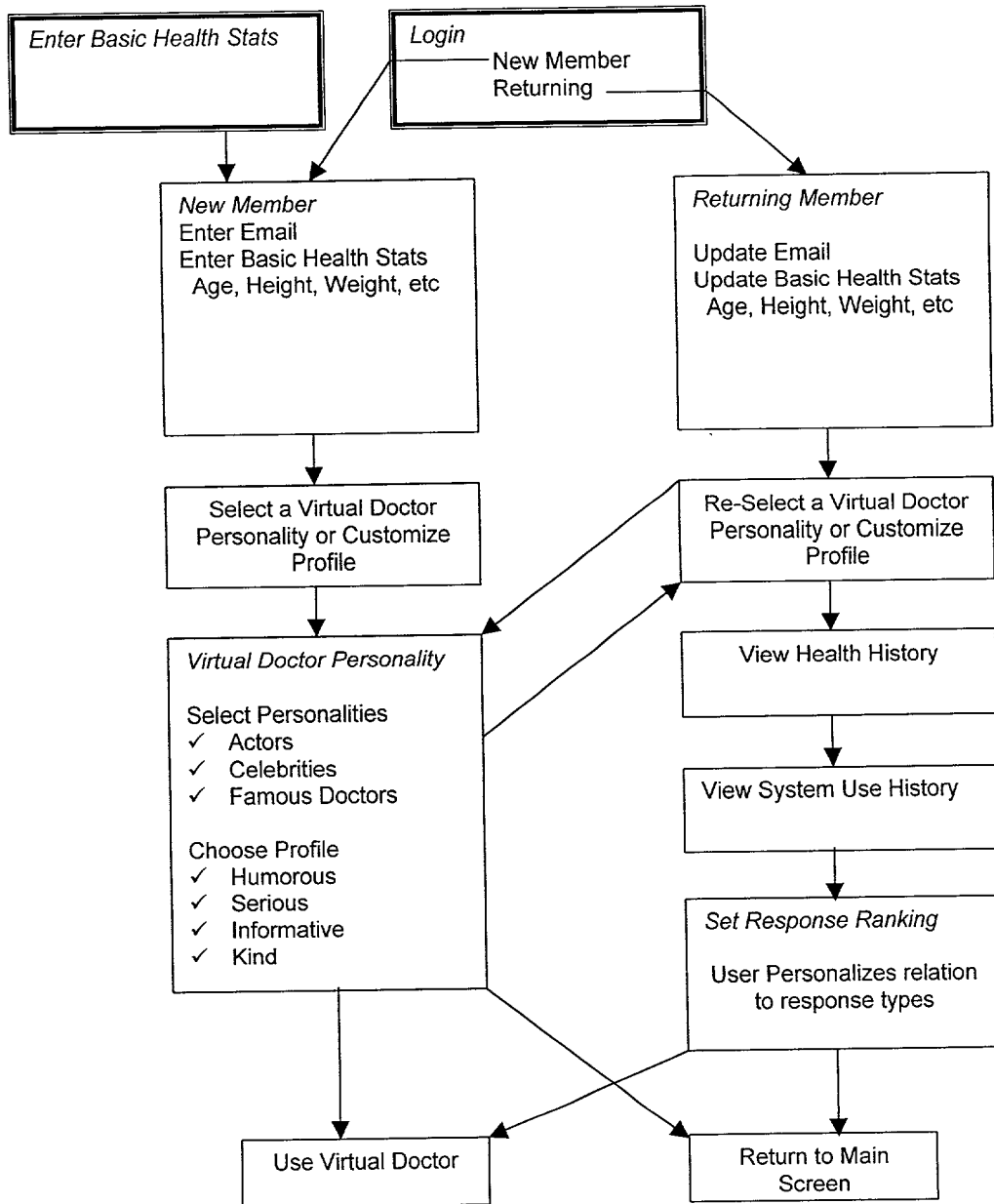


FIG. 11

"Smart" Search

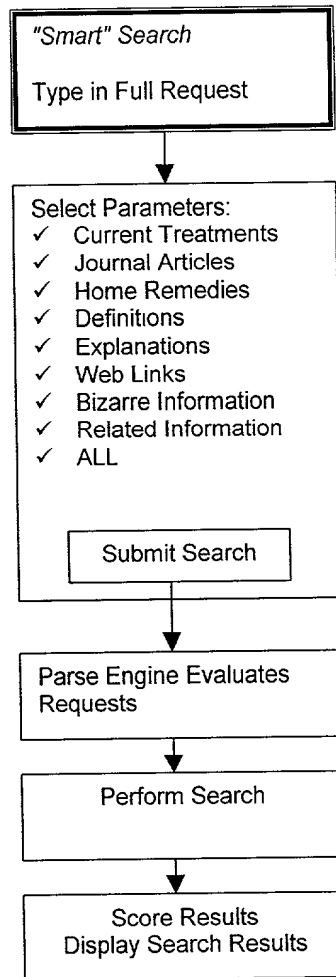


FIG. 12

ELICIT Algorithm 42 (Processing Responses to Queries)

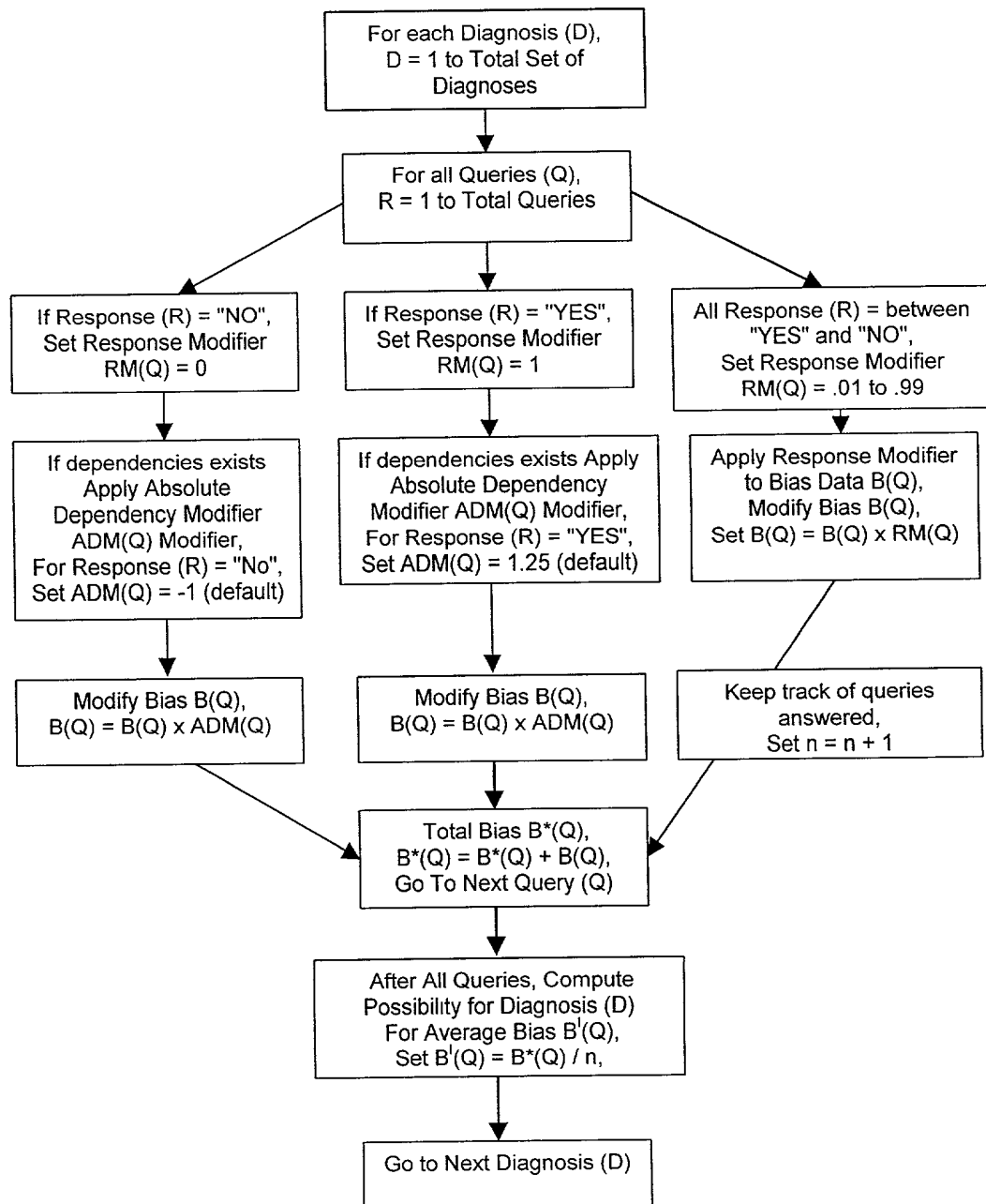


FIG. 13

Please circle/select all the areas where you feel tenderness or pain/discomfort pain?

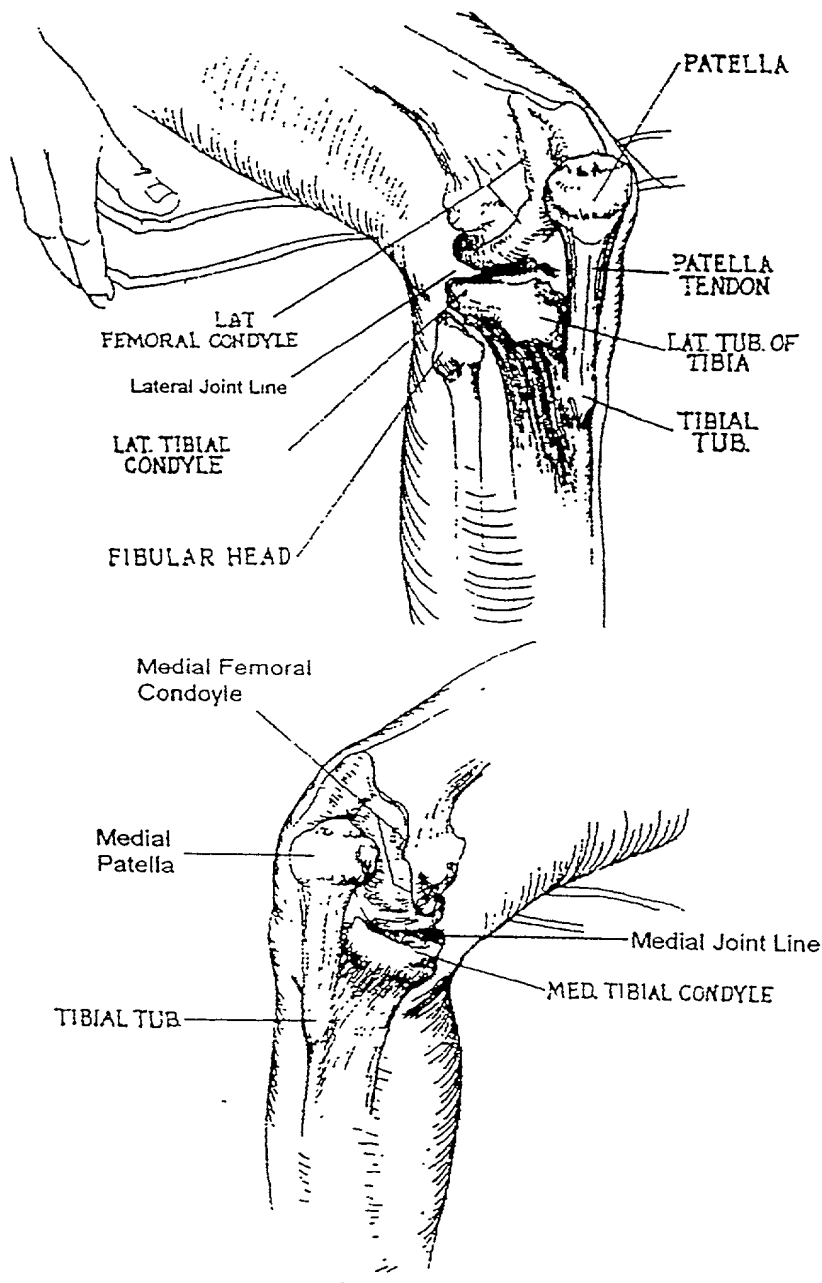


FIG. 14

Don't wait for Doctors online anymore!

Your Personal Online Doctor...Now!

Want to know what could be wrong with you instantly and get specific information on insurance, treatments, specialists, perscriptions, home remedies and more ?

Just use our free "Virtual Doctor" application with utilizes advanced logic technology to accurately determine your paticular aligment. Ofcourse, you should never use this service to replace professional medical advice from your physican. Infact, we recommend always to seek professional medical advice regardless of the diagnostic response you recieve.

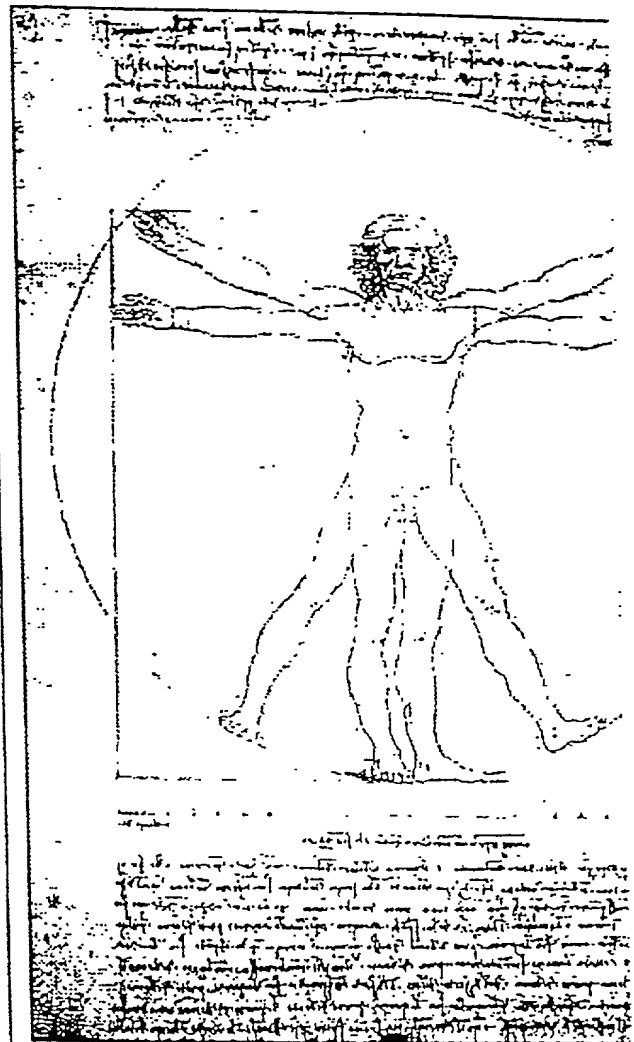


FIG. 15

Non-Injury Activities. Please select any activity that causes pain or discomfort.

- | | |
|---|---|
| <input type="text" value="No"/> | Walking in general or level ground (help) |
| <input type="text" value="No"/> | Walking up or down hills (help) |
| <input type="text" value="No"/> | Running (help) |
| <input type="text" value="Yes"/> | Biking (help) |
| <input type="text" value="Sometimes"/> | Squatting (help) |
| <input type="text" value="Maybe"/> | While sitting (help) |
| <input type="text" value="No"/> | Extended sitting (help) |
| <input type="text" value="Don't remember"/> | In notion standing UP (help) |
| <input type="text" value="No"/> | In motion sitting DOWN (help) |

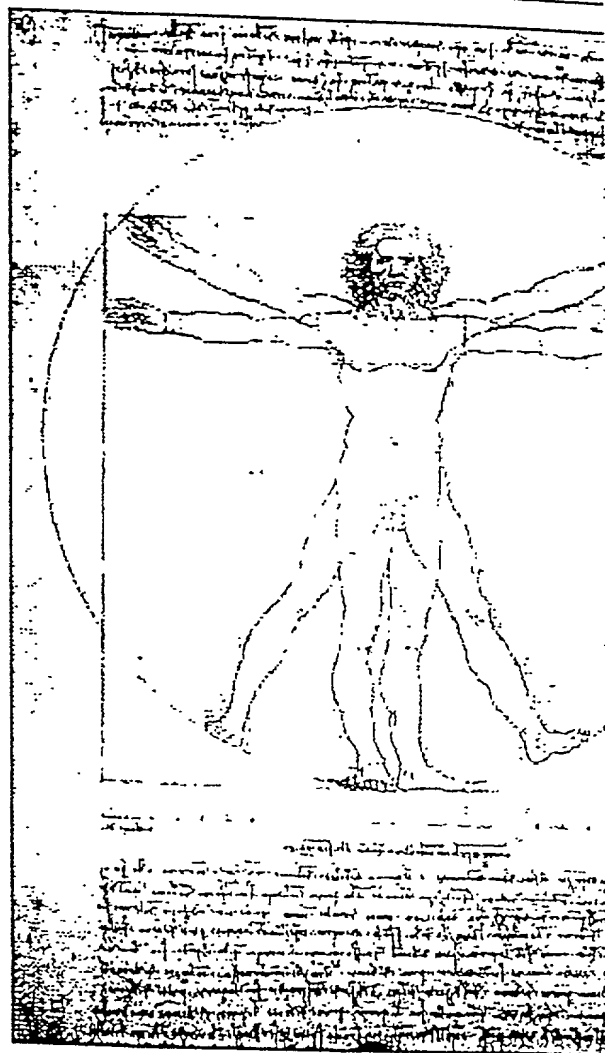


FIG. 16

ELICIT Scalar Range, Rules, Possibility Scoring

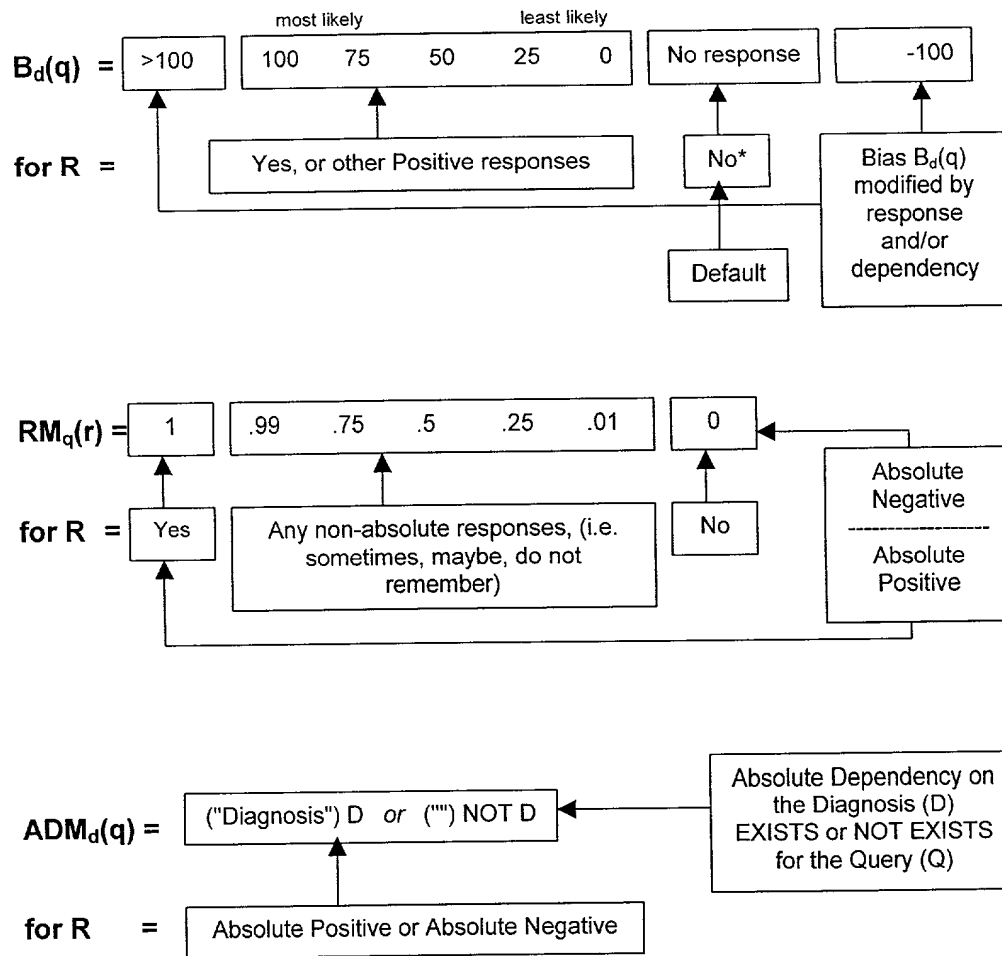


FIG. 17

Enter Questionnaire

Edit Data

Edit Data by
Questions

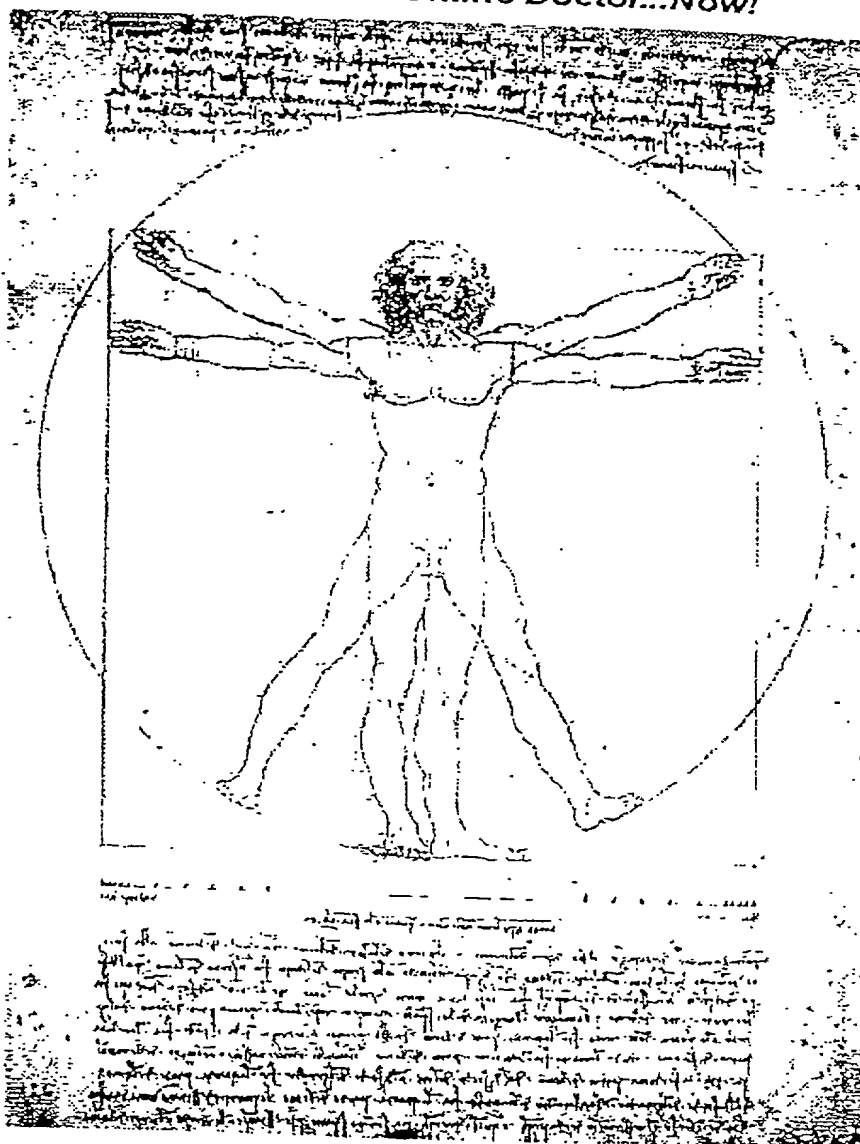


FIG. 18

Pre-Diagnostic Questionnaire

Clear All

FIG. 19

Variable	Mean	SD	Min	Max	Skewness	Kurtosis	Shapiro-Wilk	Normality
Age	38.5	12.5	25	65	-0.1	3.2	0.98	Normal
Gender	1.2	0.4	1	2	0.5	2.1	0.95	Normal
Marital Status	1.8	0.8	1	3	0.2	2.5	0.97	Normal
Education	15.2	2.1	12	18	-0.3	3.5	0.99	Normal
Income	12.5	3.5	8	18	0.1	2.8	0.96	Normal
Occupation	1.5	0.5	1	3	0.4	2.2	0.94	Normal
Religion	1.1	0.3	1	2	0.3	2.0	0.96	Normal
Health Status	1.5	0.5	1	3	0.2	2.4	0.97	Normal
Stress Level	2.5	1.0	1	4	0.1	2.9	0.98	Normal
Life Satisfaction	3.5	1.2	2	5	-0.2	3.1	0.99	Normal
Resilience	4.5	1.5	3	6	-0.1	3.3	0.98	Normal
Optimism	3.8	1.1	2	5	-0.3	3.4	0.99	Normal
Emotional Stability	4.2	1.3	3	6	-0.2	3.2	0.98	Normal
Self-Esteem	4.0	1.2	3	5	-0.1	3.0	0.99	Normal
Life Purpose	3.2	1.0	2	4	-0.2	3.1	0.98	Normal
Meaning in Life	3.0	0.9	2	4	-0.1	2.9	0.99	Normal
Existential Well-being	2.8	0.8	2	4	-0.2	2.8	0.98	Normal
Overall Well-being	3.5	1.0	2	5	-0.1	3.0	0.99	Normal

Ability	Area Diagnosis
38	Ankle Sprain III
75	Ankle Sprain I, II
25	Achilles rupture
13	Osteochondritis Dissecans
13	Morton's Neuroma
18	Stress Fx of 2nd metatarsal
25	Plantar Fasciitis
8	Pez Planus
3	Accessory Navicular
3	Bunlon
3	Posterior tibialis syndrome
3	Hammer toe
3	Degenerative Arthritis
5	Gout
1	Infection

FIG. 20

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Edit Fuzzy Data

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New Diagnosis

PHYSICAL AREA Knee

AREA DIAGNOSIS Patella Malalignment

FIG. 21

Diagnosticall

Fuzzy Resp

Fuzzy Questions Fuzzy Data y Dependent

Was it a recent injury?	30	Yes	
Did you trip or fall?	20	Yes	
Were you in an accident involving a vehicle?	20	Yes	
Were you playing a sport?	50	Yes	Yes
Did you twist your knee?	40	Yes	
Did you injury your knee while jumping?	70	Yes	
Was the injury pain immediate?	60	Yes	
Was the injury pain delayed?	40	Yes	
Was the injury swelling immediate?	20	Yes	
Was the injury swelling delayed?	70	Yes	
Is there swelling above or around the kneecap?	40	Yes	Yes
Walking in general or level ground	40	Yes	Sometim
Walking up or down hills	70	Yes	Sometim
Running	80	Yes	Yes
Biking	70	Yes	Sometim
Squatting	70	Yes	Sometim
While sitting	70	Yes	
Extended sitting	90	Yes	
In notion standing UP	60	Yes	

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Edit Fuzzy Data

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New Diagnosis

In motion sitting DOWN	40	Yes
Has your knee ever locked up?	40	Yes
Do you feel a general stiffness?	50	Yes
You CAN NOT straighten your leg?	20	Yes
Does your knee give out?	80	Yes
Does your knee give out while walking straight?	80	Yes
Does your knee give out while changing directions?	50	Yes
Do you feel a loose body floating around?	30	Yes
Is the skin color around your knee normal?	90	Yes
Is the skin color around your knee black or blue?	20	Yes
Is there redness around the knee area?	10	Yes
Is there progressive angulation ?	10	Yes
Is there grinding or grating?	80	Yes
Is there any popping or snapping?	70	Yes
Do you feel weakness in the knee?	30	Yes
Do you have a fever?	10	Yes
Do you generally feel weak or tired?	20	Yes
Is there numbness anywhere?	10	Yes
At the time of injury, did you feel your knee pop out?	50	Yes
At the time of injury, did you feel a crack?	50	Yes
medial femoral condovyle check	50	Yes
medial joint line check	20	Yes
medial tibial plateau check	20	Yes
medial patella check	90	Yes

FIG. 22

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Yes

Yes

Sometim

Sometim

Yes

Maybe

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New Diagnosis

lateral patella check	70	Yes
tibial tubricle check	40	Yes
lateral femoral condoyle check	30	Yes
lateral joint line check	20	Yes
lateral tibial plateau check	10	Yes
anterior patella check	40	Yes
posterior knee check	10	Yes
Is there swelling above or around the kneecap?	55	Yes
Is there swelling in front of the kneecap?	20	Yes
Is there constant pain?	20	Yes
Is there chronic pain?	25	Yes
Age 16 to 40	60	Yes
40 to 60	40	Yes
60 to 80	25	Yes
over 80	15	Yes
Do you feel a bump or mass?	10	Yes
straighten your knee, can you feel a tender band of tissue on the inside of	40	Yes
Pain wakes at night	15	Yes
Have you ever felt your knee cap pop out?	70	Yes
		Yes
		Yes
		Yes
		Yes
		Yes
		Yes

FIG. 23

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New Diagnosis

		<input type="checkbox"/> Yes
		<input type="checkbox"/> Yes
		<input type="checkbox"/> Yes
		<input type="checkbox"/> Yes
		<input type="checkbox"/> Yes
		<input type="checkbox"/> Yes
		<input type="checkbox"/> Yes
		<input type="checkbox"/> Yes
		<input type="checkbox"/> Yes
		<input type="checkbox"/> Yes

SICAL AREA Knee

DIAGNOSIS Patella Malalignment

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863	Total Percetages
20	Total Queries
43.15	Final Calculation

FIG. 24

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Was there an injury?

Answer:
Maybe

Ability	Area Diagnosis	Was there an injury?
3	Ankle Sprain III	95
5	Ankle Sprain I, II	90
5	Achilles rupture	70
3	Osteochondritis Dissecans	75
3	Morton's Neuroma	25
3	Stress Fx of 2nd metatarsal	15
3	Plantar Fasciitis	20
3	Pez Planus	5
3	Accessory Navicular	15
3	Bunion	5
3	Posterfor tibialis syndrome	10
3	Hammer toe	5
3	Degenerative Arthritis	10
3	Gout	5
3	Infection	5

FIG. 25

Injury Activities

- ☐ Was there an injury?
- ☐ Did you trip or fall?
- ☐ Were you in an accident involving a vehicle?
- ☐ Were you playing a sport?
- ☐ Please enter the sport you were playing:
- ☐ Was it a twisting injury?
- ☐ Did you injure your knee in a jumping sport?
- ☐ Was the pain immediate or delayed?
- ☐ Was the swelling immediate or delayed?

Injury History:

- ☐ At the time of your injury, did you feel a pop in the knee?
- ☐ At the time of injury, did you feel a crack in the knee?
- ☐ Have you ever felt your knee cap pop out?

If your injury was not recent, please select all the activities that create or induce pain or discomfort:

- ☐ Walking in general, on level ground
- ☐ Walking up or down hills
- ☐ Running
- ☐ Biking
- ☐ Squatting
- ☐ While sitting
- ☐ Extended Sitting
- ☐ In Motion Standing Up
- ☐ In Motion Sitting Down

Please select all the conditions that apply to the physical state of the knee or the local area of your discomfort:

- ☐ Has your knee ever locked up?
- ☐ Do you feel a general stiffness?
- ☐ You CAN NOT straighten your leg?
- ☐ Does your knee give out?
- ☐ Does it give out while walking straight?
- ☐ Does it give out while changing directions?
- ☐ Do you feel a "loose body" floating in or around the knee? ie. a "marble" floating around?
- ☐ Is the skin color normal?
- ☐ Is the skin color black or blue?
- ☐ Is there any redness around the area?
- ☐ Is there any progressive angulation?
- ☐ Is there any grinding or grating?
- ☐ Is there any popping or snapping?
- ☐ Is there any weakness in the knee?

How do you generally feel. Please select any of the general health conditions that apply to you:

- ☐ Do you currently have a fever or had a fever in the past 12 hours?
- ☐ Do you generally feel weak or tired?
- ☐ Is there any numbness anywhere?

A few more questions:

- ☐ When you straighten your leg or knee, can you feel a tender band of soft tissue on the inside part of your knee?
- ☐ Is there swelling above or around the knee?
- ☐ Do you feel a bump or mass around the knee?
- ☐ Is there swelling in front of the kneecap?
- ☐ Is there any chronic or constant pain?

FIG. 26

Query Object in Database

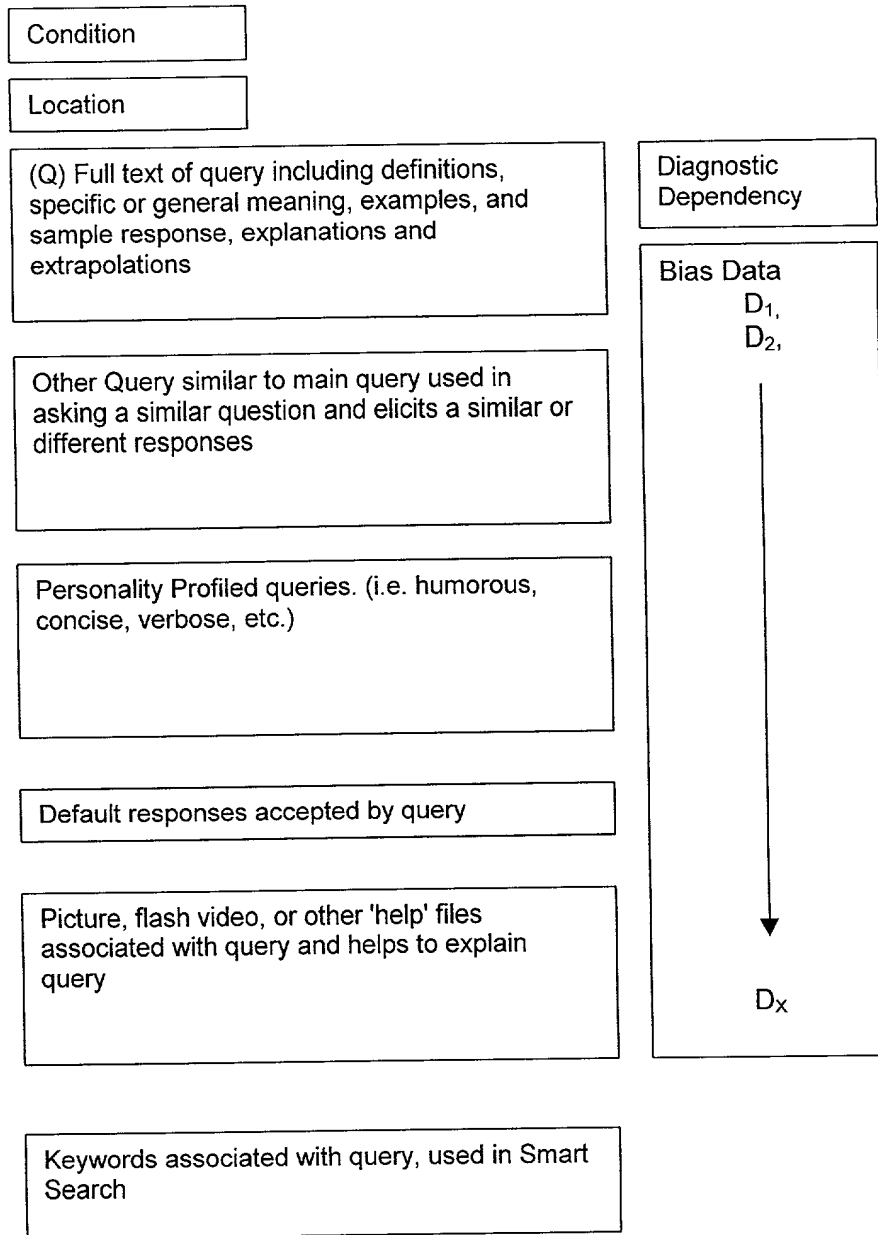


FIG. 27

"Hammertoe", "5", "10", "5", "5", "5", "5", "5", "25", "30", "40", "5", "5", "5", "95", "5", "5", "5", "5", "5", "20", "45", "60", "35", "35", "15", "20", "5", "5", "5", "5", "10", "10", "10", "30", "10", "30", "10", "10", "10", "35", "65", "45", "95", "80"

"Ankle Sprain
III", "95", "60", "40", "90", "90", "95", "20", "10", "90", "95", "95", "95", "95", "20", "95", "40", "5", "10", "5", "10", "5", "5", "5", "15", "5", "20", "5", "5", "95", "95", "25", "5", "5", "5", "5", "15", "35", "60", "50", "30", "15", "5", "5"

"Ankle Sprain I.
II", "90", "60", "40", "90", "90", "85", "20", "10", "80", "85", "90", "90", "95", "65", "75", "90", "30", "5", "10", "5", "10", "5", "5", "5", "5", "15", "5", "20", "5", "5", "25", "95", "20", "5", "10", "5", "5", "55", "15", "25", "60", "50", "30", "15", "5", "5"

"Achilles
rupture", "90", "60", "40", "15", "80", "80", "10", "90", "45", "60", "65", "25", "20", "20", "70", "20", "10", "95", "50", "10", "10", "5", "5", "5", "5", "15", "5", "20", "5", "5", "20", "20", "10", "5", "25", "5", "5", "5", "5", "10", "20", "70", "30", "10", "5", "5"

"Osteochondritis
Dissecans", "75", "50", "50", "60", "70", "60", "25", "10", "50", "60", "70", "65", "65", "65", "75", "95", "70", "5", "5", "5", "5", "10", "5", "5", "5", "15", "5", "20", "5", "5", "40", "65", "15", "5", "10", "5", "5", "5", "10", "25", "70", "30", "20", "15", "5", "5"

"Morton's
Neuroma", "25", "40", "20", "5", "10", "5", "10", "5", "40", "65", "70", "5", "5", "5", "95", "5", "5", "5", "5", "5", "5", "5", "5", "5", "5", "15", "15", "90", "5", "5", "5", "5", "5", "5", "35", "20", "95", "10", "25", "10", "25", "60", "45", "25", "5", "5"

"Bunion", "5", "20", "5", "5", "5", "5", "5", "5", "25", "30", "40", "5", "5", "5", "95", "5", "5", "5", "5", "5", "5", "85", "95", "40", "40", "40", "20", "55", "5", "5", "5", "15", "10", "10", "90", "10", "30", "15", "10", "25", "50", "65", "50", "20", "35"

"Stress Fx of 2nd
metatarsal", "15", "40", "10", "10", "35", "20", "90", "5", "80", "85", "90", "5", "5", "5", "60", "5", "5", "5", "5", "5", "5", "10", "10", "5", "10", "20", "5", "20", "5", "5", "5", "5", "5", "5", "5", "15", "15", "95", "20", "5", "20", "50", "30", "15", "10", "5"

"Degenerative
Arthritis", "10", "5", "5", "5", "5", "5", "5", "5", "60", "70", "80", "55", "55", "45", "85", "85", "25", "5", "5", "5", "5", "65", "45", "35", "5", "45", "45", "25", "5", "5", "30", "30", "15", "20", "20", "70", "5", "20", "40", "30", "10", "50", "65", "85", "30", "25"

"Plantar
Fasciitis", "20", "30", "10", "5", "5", "5", "15", "5", "50", "55", "60", "5", "5", "5", "95", "5", "5", "5", "95", "80", "95", "5", "10", "5", "5", "15", "5", "20", "5", "5", "5", "5", "25", "85", "90", "5", "15", "10", "25", "10", "15", "70", "35", "20", "5", "5"

"Accessory
Navicular", "15", "20", "20", "10", "10", "5", "10", "5", "40", "50", "60", "15", "5", "15", "95", "15", "5", "5", "10", "5", "35", "5", "5", "5", "5", "15", "10", "20", "5", "5", "50", "30", "95", "20", "25", "10", "10", "10", "40", "95", "40", "30", "30", "10", "5", "5"

"Pez
Planus", "5", "30", "5", "5", "5", "5", "5", "30", "40", "50", "5", "5", "5", "95", "5", "5", "5", "5", "15", "15", "25", "25", "30", "5", "95", "75", "20", "5", "10", "5", "15", "20", "15", "15", "20", "10", "10", "85", "20", "15", "25", "35", "25", "5", "5"

"Gout", "5", "5", "5", "5", "20", "20", "5", "5", "20", "30", "35", "5", "5", "5", "95", "5", "5", "5", "5", "5", "5", "95", "95", "35", "95", "15", "10", "20", "10", "5", "5", "5", "5", "5", "5", "95", "10", "30", "10", "5", "15", "60", "40", "20", "20", "15"

"Posterior tibialis
syndrome", "10", "10", "10", "5", "5", "5", "10", "5", "40", "45", "60", "15", "5", "10", "95", "15", "5", "5", "10", "5", "35", "5", "5", "5", "5", "90", "95", "20", "5", "5", "70", "25", "75", "20", "25", "10", "10", "10", "60", "80", "10", "35", "65", "30", "5", "5"

"infection", "5", "5", "5", "5", "5", "5", "5", "5", "50", "60", "70", "90", "80", "80", "50", "70", "15", "5", "5", "5", "5", "5", "5", "5", "7", "5", "15", "5", "5", "90", "75", "10", "15", "15", "15", "15", "45", "15", "25", "30", "30", "20", "30", "40", "30", "5", "5"

FIG. 28

H Injury Activities. Please indicate whether you have had an injury recently or in the recent past that may help assess your condition.

1 1 0 none Was there an injury?

2 1 0 none Were you playing a sport?

3 1 0 none Did you trip and fall?

4 1 0 none Did you turn your foot inward?

5 1 0 none Did you have immediate pain?

6 1 0 none Did your ankle/foot swell immediately?

H Injury History. Because of an old injury do any of the following questions apply?

7 2 0 none Did you increase your workout/activity lately?

8 2 0 none Did you feel a pop in the back of your leg?

H Non-Injury Activities. Please select any activity that causes pain or discomfort.

9 3 0 none Walking

10 3 0 none Running

11 3 0 none Jumping

H Select/Answer any question(s) that apply to your current physical state of the ankle or foot.

12 4 0 none Is your ankle swollen?

13 4 0 none Is your ankle swollen on the outside (lateral)?

14 4 0 none Is your ankle swollen on both sides?

15 4 0 none Can you bear weight?

16 4 0 none Does your ankle swell intermittently?

17 4 0 none Does your ankle lock up?

18 4 0 none Can you feel a defect in your Achilles tendon?

19 4 0 none Do you have pain in your heel?

20 4 0 none Do you have pain on the bottom of your heel?

21 4 0 none Do you have pain on the side of your heel?

22 4 0 none Do you have pain in your big toe?

23 4 0 none Is there a bump?

24 4 0 none Is your big toe angled to the side? (see photo)

25 4 0 none Is your big toe red hot and swollen?

26 4 0 none Is your foot flat?

27 4 0 none Is your foot getting flatter?

28 4 0 none Is your 2nd toe longer than your big toe?

H Select/Answer any question(s) that apply to your general physical state.

29 5 0 none Do you have a fever?

30 5 0 none Are you a diabetic?

H Please select any area(s) that you feel tenderness.

31 6 0 none medial malleolus check

32 6 0 none lateral malleolus check

33 6 0 none accessory navicular check

34 6 0 none plantar heel check

35 6 0 none medial heel check

36 6 0 none great toe MTP joint check

37 6 0 none 3rd webspace check

38 6 0 none 2nd metatarsal check

39 6 0 none sole of foot at arch check

40 6 0 none medial navicular check

H Please Select your Age

41 7 0 none 18-40

42 7 0 none 40-60

43 7 0 none 60-80

44 7 0 none Over 80

H A few more question(s).

45 8 0 none Does your toe bend downward?

46 8 0 none Does your toe ride over the next toe?

FIG. 29